EAGER: Towards Securing Visible Light Communications

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Challenge:

- Security implication of light reflections (diffusive and specular)
- Countering unknown eavesdroppers in VLC
- Countering blocking and spoofing attacks in VLC

Solution:

- Friendly-jamming-assisted MIMO VLC beamforming
- Secrecy capacity of VLC channel accounting for both specular and diffusive light reflections
- Orthogonal-coding-based physical-layer VLC counter-spoofing mechanism

Multiple-input single-output VLC channel
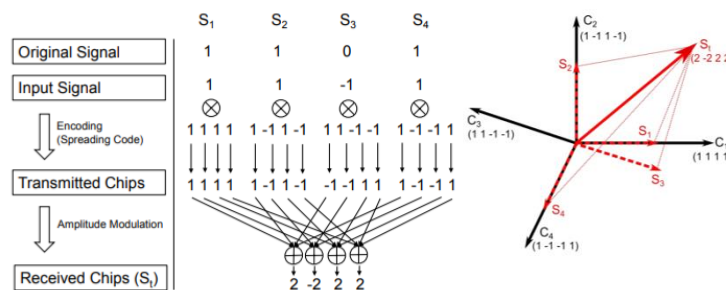
Orthogonal coding for VLC spoofing detection

VLC MIMO beamforming architecture for countering eavesdropping and spoofing

Scientific Impact:

- This is the first study on the secrecy capacity of VLC channel that accounts for both specular and diffusive light reflections.
- The proposed orthogonal-coding based VLC spoofing detection is a physical-layer security method and provides always-on protection against spoofing

Broader Impact:

- VLC is a promising solution for wireless traffic offloading in the era of 5G
- Hurdle to the large-scale adoption of VLC: its security and vulnerability is largely unknown
- Research outcome potentially benefits every wireless user
- Education impact: curriculum development and broadening the participation of underrepresented groups in STEM